Michael Charles Healey
Curriculum Vitae

Contact Information:
6335 York Lane
Peachland, BC
Canada
V0H 1X7
Phone: 250-767-2279
Email: healey@interchange.ubc.ca

Education:
BSc (Hons Zoology) University of British Columbia, Vancouver, BC, 1964
MSc (Zoology) University of British Columbia, Vancouver, BC, 1966
PhD (Natural History) University of Aberdeen, Scotland, UK, 1969

Narrative biography:
I am an ecologist with more than 40 years experience in research and teaching about problems in fisheries and water resources management. I received bachelors and masters degrees in zoology from the University of British Columbia (1964 and 1966) and a PhD in natural history from the University of Aberdeen (Scotland, 1969). Following a postdoctoral fellowship at Canada's Pacific Biological Station, I joined the research staff of the newly created Freshwater Institute in Winnipeg where I conducted research on the productivity and management of whitefish and lake trout fisheries in Canada's north. Rules that I developed for the conservation and management of these species remain important guidelines for managers today. During this time, I also became engaged in broader issues of water resources management, participating in committees to assess the impact of the proposed Mackenzie Valley oil pipeline and Mackenzie Valley highway.

In 1974, I accepted a position at the Pacific Biological Station in British Columbia where, I led a number of multidisciplinary projects on the ecology and productivity of Pacific salmon. These projects addressed problems of conservation and management of salmon at all life history stages in both freshwater and marine habitats. Although I conducted research on all five species of Pacific salmon found in North America, I became particularly well known internationally for my research on Chinook salmon. During my tenure at the Pacific Biological Station, I continued to pursue my widening interest in water and environmental management, becoming president of the Rawson Academy of Aquatic Science and editing a book on Canadian Aquatic Resources. I was also the government's principal scientific representative on a team established to address flow needs for salmon conservation in the Nechako River. The Nechako River flow controversy pitted Canada against British Columbia and the Aluminum Company of Canada over minimum conservation flows. I was one of the architects of a settlement agreement that established a joint management committee for the river and an adaptive management regime for addressing uncertainty in minimum flow needs.

In 1990, I joined the faculty of the University of British Columbia as Director of the Westwater Research Centre, an interdisciplinary centre for research on science and policy issues related to water. As centre director, I secured funding for a number of significant research projects, most notably a prestigious “ecoresearch” grant from a funding program established by the Canadian government to support interdisciplinary research on environmental problems in Canada. The project, entitled “seeking sustainability in the lower Fraser River basin”, received $2.4 million in funding, the largest single grant awarded under the granting program. Under this project, 23 faculty and 60 graduate students from natural sciences, social sciences and engineering tackled the complex problems of sustainability in the lower Fraser River basin where forestry, agriculture, urban growth and fisheries all interact. At UBC, I continued to research problems of Pacific salmon ecology and management, securing a series of grants ranging from $750,000 to $1 million to study ocean migrations, ecological energetics, reproductive behaviour and impacts of climate change.

While at UBC, I served on a number of nationally important committees. I was a member of the environmental impact assessment committee for the Oldman River dam in southern Alberta. This assessment brought the limitations of Canada’s EIA process into focus and helped stimulate new legislation. I served as advisor to the Federal Department of Fisheries in a Provincial Energy Board review of the Nechako River agreement. I was a member of the scientific advisory committee for the Northern River Basin’s Study, a project funded under the Canada Water Act to develop a sustainable management regime for the Peace, Athabasca and Slave rivers in the upper Mackenzie River basin. I was invited to become the lead scientist for this project but declined because of to my commitments at UBC. I served as scientific advisor in the environmental assessment for relicensing of the Aishihic hydro project in the Yukon. I chaired a Royal Society of Canada committee to assess the effectiveness of aquatic science in Canada. And I was senior scientist on the Board of Directors for the Canadian Water Network, a federally funded science network for research on water in Canada. Other national committee appointments are listed in my full CV. Internationally, I served on committees to assess the impact of lake trout on Yellowstone cutthroat trout in Yellowstone Lake, the causes of rapidly changing species abundance in Flathead Lake and implications for threatened bull trout populations, ecological restoration in California, and measures to conserve the endangered Formosa landlocked salmon in Taiwan. During 2007 and 2008 I was lead scientist for the CALFED Bay-Delta program in California.

I have published more than 230 articles and reports and edited 3 books on issues of science, fishery management and water resources management. I am an expert in fishery science, ecosystem based management and adaptive management. I am particularly concerned with how scientific information gets translated into public policy. It was this interest that first stimulated me to become engaged in issues of decision making and policy making with respect to fisheries and water resources and to pursue research projects that were multidisciplinary or transdisciplinary in nature. My commitment to multidisciplinary solutions to complex environmental problems has made me conversant with a number of disciplines outside ecology, most notably resource economics, policy analysis, and some aspects of decision theory. I am one of only a few Canadian

academics that received research funding from both the Natural Sciences and Engineering Research Council and the Social Sciences and Humanities Research Council. In 2007, I retired from active teaching at UBC (becoming professor emeritus) but I continue to conduct research and write scientific papers on issues of fishery and water resources management.

Employment:

Postdoctoral Fellow, Fisheries Research Board of Canada, Nanaimo, BC, 1969-1970
Research Scientist, Canadian Department of Environment, Freshwater Institute, Winnipeg, MB, 1970-1974
Research Scientist, Program Leader, Fisheries and Oceans Canada, Pacific Biological Station, Nanaimo, BC, 1974-1990
Professor and Director, Westwater Research Centre, University of British Columbia, Vancouver, BC, 1990-1995
Professor, Institute for Resources, Environment and Sustainability, University of British Columbia, Vancouver, BC, 1995-2007
Professor Emeritus, Institute for Resources, Environment and Sustainability, University of British Columbia, Vancouver, BC, 2007-Present
Lead Scientist, Calfed Bay-Delta Program, Sacramento, CA. 2007-2008
Visiting Professor in Canadian Studies, Kwansei Gakuin University, Nishinomiya, Hyogo, Japan, 2009-2010

Leaves from Government Service and from UBC:

Visiting Senior Policy Fellow, Woods Hole Oceanographic Institute, Woods Hole, MA, 1981-82
Visiting Professor, University of British Columbia, Vancouver, BC, 1988-89
Fulbright Fellow, University of Rhode Island, Kingston, RI, 1995-96
Fulbright Fellow, University of Rhode Island, Kingston, RI, 2002-03
Visiting Professor in Canadian Studies, Kwansei Gakuin University, Nishinomiya, Hyogo, Japan, 2005-06

Academic Awards, Distinctions:

Union Carbide of Canada Scholarship - 1960-64.
B.C. Government Scholarships - 1961-64
National Research Council of Canada Scholarship - 1964-66
National Research Council of Canada Special Scholarship - 1966-68
National Research Council of Canada Postdoctoral Fellowship - 1969-70
Senior Policy Fellowship, Woods Hole Oceanographic Institution - 1982-83
Fulbright Fellowship, University of Rhode Island, Kingston, RI, 1995-96
Collaborative Residency Award, Rockefeller Study and Learning Center, Bellagio, Italy, July 1999
Visiting Scholar, Peter Wall Institute for Advanced Studies, UBC, October-December 2001
Fulbright Fellowship. University of Rhode Island, Kingston, RI, 2002-03
Fisheries and Oceans Canada Silver Medal, 1987
Citation Classic - Aggression and self-regulation of population size in deer mice, 1984

American Fisheries Society Award of Excellence, 2005

Appointments as Advisor (Last 10 years only):

Board of Directors, Canadian Water Network, National Network of Centres of Excellence (Senior Scientist) 2001-05

SSHRC Midterm Review Committee, Coasts Under Stress project, St. John's, NF. 2002.

Science Board, Ecological Restoration of the Sacramento-San Joaquin Delta, CALFED Bay-Delta program, Sacramento, California, 2000-2005

Independent Science Board, CALFED Bay-Delta Program, Sacramento, California, 2006

Teaching and Graduate Supervision:

I teach courses in fishery management, coastal resources management, estuarine ecology, watershed management, environmental policy and science in public policy.

I have supervised a total of 24 post graduate students (3 PDF, 9 PhD, 12 MSc)

Research Interests:

1. Fisheries Ecology:

I have 40 years of experience in research on the population ecology and behaviour of fishes. I am internationally recognized as an expert in the ecology and behaviour of Pacific salmon. Current research activities include ecological energetics and behaviour of migrating and spawning of Pacific salmon in relation to environmental constraints.

2. Resource Management Science:

I have 35 years of experience in conducting research and in advising policy makers on natural resources management. Most of my research in this area has emphasized issues in fishery management and most of my advisory activity over the past decade has involved regulated rivers and ecological restoration in rivers and deltas. Recently both my research and my advice have emphasized the importance of adaptive management and ecosystem based management.

3. Science in Public Policy:

I have 30 years of experience in collaborative research with social scientists on the role of science in public policy. This research explores the institutional arrangements for natural resource management and the roles that science plays in the development and evolution of resource management policy. This area of research integrates well with my interest in adaptive management and ecosystem based management.

Research Grants and Contracts:

Over my academic career I have been awarded more than $9 million in grants and contracts to support my research.

Publications:

My publications total > 230 of which 115 appeared in peer reviewed journals or monographs. Below is a selection of publications from throughout my career.

1967 Healey, M.C. Aggression and self-regulation of population size in deermice. *Ecology* 48: 377-392. (Citation Classic)

1975 Healey, M.C. Dynamics of exploited whitefish populations and their management with special reference to the Northwest Territories. *Journal of the Fisheries Research Board of Canada* 32: 427-448.

1979 Healey, M.C. Detritus and juvenile salmon production in the Nanaimo estuary: 1. Production and feeding rates of juvenile chum salmon (*Oncorhynchus keta*). *Journal of the Fisheries Research Board of Canada* 36: 488-496.

1980 Healey, M.C. Utilization of the Nanaimo River estuary by juvenile chinook salmon, *Oncorhynchus tshawytscha*. *Fishery Bulletin* 77: 653-668.

1980 Healey, M.C. Growth and recruitment in experimentally exploited lake whitefish (*Coregonus clupeaformis*) populations. *Canadian Journal of Fisheries and Aquatic Science* 37: 225-267.

1984 Healey, M.C. and W.R. Heard. Inter- and intra-population variation in the fecundity of chinook salmon (*Oncorhynchus tshawytscha*) and its relevance to life history theory. *Canadian Journal of Fisheries and Aquatic Science* 41: 476-483.

1984 Healey, M.C. Multiattribute analysis and the concept of optimum yield. *Canadian Journal of Fisheries and Aquatic Science* 41: 1393-1406.

1986 Holtby, L.B. and M.C. Healey. Selection for adult size in female coho salmon. *Canadian Journal of Fisheries and Aquatic Science* 43: 1946-1959.

1990 Healey, M.C. Implications of climate change for fisheries management policy. *Transactions of the American Fisheries Society* 119: 366-373.

1990 Holtby, L.B. & M.C. Healey. Sex specific foraging strategies and risk taking in coho salmon. *Ecology* 71: 678-690.

1991 Healey, M.C. The life history of chinook salmon. pp. 311-393 *In*: C. Groot & L. Margolis (*ed*.) Pacific Salmon Life Histories. U.B.C. Press, Vancouver.

1993 Henderson, M. A., and M. C. Healey. Doubling salmon production in the Fraser River: Is this sustainable development? *Environmental Management* 17:719-728.

1993 Healey, M. C. The management of Pacific salmon fisheries in British Columbia. pp 243-266 In: L. S. Parsons and W. H. Lear (ed.), Perspectives on the Canadian marine fisheries management experience, *Canadian Bulletin of Fisheries and Aquatic Science. 226.*

1994 Healey, M. C., and T. M. Hennessey. The utilization of scientific information in the management of estuarine ecosystems. *Ocean and Coastal Management* 23:167-190.

1994 Tallman, R. F., and M. C. Healey. Homing, straying and gene flow among seasonally separated populations of chum salmon (*Oncorhynchus keta*). *Canadian Journal of Fisheries and Aquatic Science.* 51:577-588.

1997 Walter, E. E., J. P. Scandol, and M. C. Healey. Ocean migration patterns of Fraser River sockeye salmon: a reanalysis of accepted patterns. *Canadian Journal of Fisheries and Aquatic Science* 54:847-858

1998 Healey, M. C. Paradigms, policies and prognostication about watershed ecosystems and their management. pp. 662-682 In: R. Naiman and R. Bilby (ed.) Ecology and

management of streams and rivers in the Pacific Northwest ecoregion. Springer Verlag, New York.

1998 Healey, M. C., and T. Hennessey. The Paradox of Fairness: The Impact of Escalating Complexity on Fishery Management. *Marine Policy.* 22:109-118

1999 Healey, M. C., J. Robinson, R. Shearer, B. Wernick, and R. Woollard. Sustainability issues and choices in the lower Fraser basin. In. M. Healey (ed.) Sustainability issues and choices in the lower Fraser basin: resolving the dissonance. UBC Press, Vancouver.

1999 Giannico, R. and M. Healey. Ideal free distribution theory as a tool to examine juvenile coho salmon habitat choice under different conditions of food abundance and cover. *Canadian Journal of Fisheries and Aquatic Science* 56:2362-2373.

2000 Hennessey, T., and M.C. Healey. Ludwig's ratchet and the collapse of New England groundfish stocks. *Coastal Management.*28:187-213.

2001 Healey, M.C., P. Kline, and C-F Tsai. Saving the endangered Formosa landlocked salmon.*Fisheries* 26:6-13.

2001 Healey, M.C. Patterns of reproductive investment by stream- and ocean-type chinook salmon (*Oncorhynchus tshawytscha*). *Journal of Fish Biology* 58:1545-1556

2003 Healey, M.C., R. Lake, and S.G. Hinch. Energy expenditures during reproduction by sockeye salmon (*Oncorhynchus nerka*). *Behaviour* 140:161-182.

2004 Cooke, S.J., S.G. Hinch, A.P. Farrell, M.F. Lapointe, S.R.M. Jones, J.S. Macdonald, D.A. Patterson, M.C. Healey, and G. Van Der Kraak. Abnormal migration timing and high en route mortality of sockeye salmon in the Fraser River, British Columbia. *Fisheries* 29:22-33.

2004 Mehranvar, L., M.C. Healey, A.P. Farrell, and S.G. Hinch. Social versus genetic measures of reproductive success in sockeye salmon, *Oncorhynchus nerka*. *Evolutionary Ecology Research* 6:1167-1181.

2006 Rand, P.S., S.G. Hinch, J. Morrison, M.G.G. Foreman, M.J. Macnutt, J.S. Macdonald, M.C. Healey, A.P. Farrell, and D.A. Higggs. 2006. Effects of River Discharge, Temperature, and Future Climates on Energetics and Mortality of Adult Migrating Fraser River Sockeye Salmon. Trans. Amer. Fish. Soc. 135:655–667

2006. Blann, C.A., and M.C. Healey. Effects of species, culture history, size and residency on relative competitive ability of salmonids Journal of Fish Biology 69:535–552.

2007 McVeigh, B.R., Healey, M.C., and Wolfe, F. 2007. Energy expenditures during spawning by chum salmon Oncorhynchus keta (Walbaum) in British Columbia. Journal of Fish Biology, 71(6): 1696-1713

2008. Healey, M.C. Science and the Sacramento San-Joaquin Delta. Chapter 1 in "State of Bay-Delta Science, 2008", M. Healey, R. Norgaard, and M. Dettinger eds. CALFED Science Program, Sacramento, CA.

2008. Healey, M.C. Science in policy development for the Bay-Delta ecosystem. Chapter 8 in "State of Bay-Delta Science", M. Healey, R. Norgaard, and M. Dettinger eds. CALFED Science Program, Sacramento, CA.

2009 Healey, M. C.. Resilient Salmon, Resilient Fisheries for British Columbia, Canada. Ecology and Society 14(1):2. [online] URL: http://www.ecologyandsociety.org/vol14/iss1/art2/

Books Edited

1987 Healey, M.C. and R.R. Wallace. Canadian Aquatic Resources. *Canadian Bulletin of Fisheries and Aquatic Science* 215: 1-533.

1999 Healey, M. C. Seeking Sustainability in the Lower Fraser Basin: Issues and Choices. Institute for Resources and Environment, University of B.C. Press.

2008 Healey, M.C., M. Dettinger, R. Norgaard. State of Bay-Delta Science, 2008. CALFED Science Program, Sacramento, CA.